NEW CASTLE COUNTY

DEPARTMENT OF PUBLIC WORKS

MIDDLETOWN-ODESSA-TOWNSEND

REGIONAL WASTEWATER TREATMENT PLANT

PRETREATMENT PROGRAM SUBMISSION

NOVEMBER 30, 1983

FOREWORD

This document was prepared for the Department of Public Works, New Castle County, Delaware, by J.B. Asthana, Ph.D., P.E., Sanitary Engineer, in compliance with General Pretreatment Regulations, 40 CFR Parts 125 and 403. The writer disclaims responsibility for the excessive verbiage for such a small program which had to be provided in response to initial E.P.A. comments. Material has been freely borrowed from the draft "Procedures Manual for Preparing a POTW Pretreatment Program Submission, April 29, 1983" prepared by JRB Associates for the Environmental Protection Agency.

Assistance of the M-O-T Pretreatment Committee, in particular Mr. Bruce Kraeuter of the Water Resources Agency, is gratefully acknowledged.

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1. INTRODUCTION

The Middletown-Odessa-Townsend (M-O-T) Regional Wastewater Treatment Facility is located near Odessa, New Castle County, Delaware. The tertiary treatment plant started operating in April 1981 and discharges into Appoquinimink River, a tidal tributary to Zone 5 of the Delaware River. At this time it receives wastewaters from the Town of Middletown, St. Andrews School and the Town of Odessa. The Townsend POTW is under a compliance schedule to connect into the M-O-T system.

The revised NPDES Permit No. DE0050547, effective December 1, 1981, (Appendix A) allows an average discharge of 0.5 mgd. In addition to limitations on conventional pollutants, there are water quality based limitations on Lead, and monitoring requirements for D.O. and temperature. Special Condition A.6 requires development of a Pretreatment Program.

New Castle County Department of Public Works decided to develop the Pretreatment Program in-house in view of the excessive paper work and manhours required in the construction grant process. During 1980 preliminary discussions were held with the New Castle County Water Resources Agency and the Town of Middletown. In early 1981, the M-O-T Pretreatment Committee was formalized (Table I) with representatives from the Water Resources Agency (the Coordinating Agency), Public Works, Town of Middletown, and Middletown Industries. This committee met on March 5, 1981 and on March 20, 1981 (Appendix B), and will continue to participate in program development and implementation.

Progress report on Pretreatment Program Development was submitted to the State of Delaware Division of Environmental Control on January 14, 1982.

WATER RESOURCES AGENCY
FOR NEW CASTLE COUNTY

TABLE 1

M-O-T PRETREATMENT COMMITTEE

MEMBERSHIP LIST

Representing Local Industry

Mr. Harold Walls, General Manager
Johnson Controls
P.O. Box 287
Middletown, DE 19709
378-9885

Representing Town of Middletown

Mr. Robert Bradley
Kidde Consultants
Commonwealth Building
Suite 103
University Office Plaza
Newark, DE 19702
731-9176

Representing New Castle County

Mr. Jit Asthana
New Castle County Department of Public Works
2701 Capitol Trail
Newark, DE 19711
571-7867

Representing Water Resources Agency
Mr. Bruce Kraeuter
Water Resources Agency for New Castle County
2701 Capitol Trail
Newark, DE 19711
366-7827

Comments on this submission were received on December 27, 1982. This program submission attempts to incorporate revisions in accordance with those comments. If approved, necessary steps will be taken to implement the recommendations summarized on Section 1.3.

1.1 NATIONAL PRETREATMENT PROGRAM

The goal of the U.S. Environmental Protection Agency's (EPA) National Pretreatment Program is to protect municipal treatment plants (commonly called "POTWs" for "publicly-owned treatment works") and the environment from the damage that may occur when hazardous or toxic wastes are discharged into a sewage system. This protection is achieved mainly by regulating nondomestic users of POTWs that discharge toxic wastes or exceedingly strong conventional wastes. There are four major problems that can be prevented through implementation of a local pretreatment program:

(1) Interference with POTW operations. Since municipal treatment systems are designed primarily to treat domestic wastes, the introduction of nondomestic wastes may harm these systems. For example, the bacteria in activated sludge systems or digesters can be poisoned by toxic pollutants. The result is interference or inhibition of the treatment process, which means that domestic and industrial wastes are discharged essentially untreated into the receiving stream.

(2) Pass-through of pollutants. Even when pollutants do not interfere with the treatment systems, they often pass-through POTWs without being removed because the systems are not designed to remove them. In many cases, industries may not be allowed to directly discharge these pollutants into a lake or stream because of potential environmental damage.

(3) Municipal sludge contamination. The removal of certain pollutants by the POTW's treatment system is likely to result in contamination of its sludge. If the sludge is buried in an unsecured landfill, these pollutants may leach and contaminate adjacent surface waters and aquifers. If the sludge is incinerated, these pollutants may be release to the air. If the sludge is applied to agricultural land, crops or pasture grasses may no longer be safe for human or animal consumption. In general, industrial pollutants (especially metals), can limit the POTW's sludge management alternatives and increase the cost of appropriate sludge disposal methods.

(4) Exposure of workers to chemical hazards. When combined with domestic wastes, industrial wastes can produce poisonous gases, such as hydrogen sulfide, which may be hazardous to POTW personnel.

EPA first issued regulations for the National Pretreatment Program on June 26, 1978. The revised regulations became final on January 28, 1981, with an effective date of March 30, 1981. The General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR 403) require that any POTW (or combination of POTWs operated by the same authority) with a design flow greater than 5 million gallons per day (mgd) must establish a pretreatment program as a condition of its National Pollutant Discharge Elimination System (NPDES) permit. POTWs with design flows less than 5 mgd may also be required to establish a pretreatment program if nondomestic waste causes upsets, sludge contamination, or violations of NPDES permit conditions, or if their industrial users are subject to national pretreatment standards. EPA estimates that about 2,000 of the Nation's 14,000-plus permitted POTWs must develop programs. The remaining municipal treatment plants are not believed to be receiving industrial wastes of concern and will probably not require pretreatment programs.

The General Pretreatment Regulations establish prohibited discharge standards and categorical pretreatment standards to control pollutant discharges into treatment plants. Prohibited discharge standards apply to all industrial and commercial establishments connected to POTWs. Categorical pretreatment standards apply to industrial and commercial discharges in 26 specific industrial categories determined to be the most significant sources of toxic pollutants.

Prohibited discharge standards protect the POTW's plant and operations by prohibiting the discharge of pollutants that:

- Create a fire or explosion hazard in the sewers or treatment works;
- Are corrosive (with a pH lower than 5.0);
- Obstruct flow in the sewer system or interfere with operation;
- Upset the treatment processes or cause a violation of the POTW's permit;
- Increase the temperature of wastewater entering the treatment plant to above 104° F (40°C).

Categorical pretreatment standards, published as separate regulations, contain limitations for pollutants commonly discharged by the subject industry. All firms regulated by a particular category are required to comply with these standards wherever they are located. One hundred and twenty-nine toxic pollutants are being considered for regulation in the 26 categorical standards.

Municipalities will use these national standards, as well as locally-developed rules, to control nondomestic users discharging to their wastewater collection and treatment systems. A local pretreatment program is the legal, technical, and administrative framework for achieving effective control of such dischargers. States participate in the National Pretreatment Program because the Federal pretreatment regulations require all States that administer NPDES programs to develop and administer State pretreatment programs. States with approved programs are expected to oversee and coordinate the development of local pretreatment programs, and approve or disapprove local pretreatment program submissions. If a State does not administer a pretreatment program, then EPA is the Approval Authority for local pretreatment programs. Delaware State participates in pretreatment activities even though the State program is not yet approved.

1.2 PRETREATMENT PROGRAM REQUIREMENTS

The development and implementation of a pretreatment program is a condition of M-O-T treatment plant's existing NPDES permit. A compliance schedule is attached to the permit requiring the submission of certain elements of the pretreatment program by prescribed dates (Appendix A).

A local program must include the following six general elements that parallel the compliance schedule activities:

(1) Industrial Waste Survey - The POTW must identify and evaluate the nondomestic discharges to its treatment system

(2) Legal Authority - The POTW must operate under a legal authority that will enable it to apply and enforce the requirements of the General Pretreatment Regulations and any other State or local rules needed to control nondomestic discharges

(3) Technical Information - The POTW must develop local discharge limitations designed to protect the operation of its treatment plant, the quality of its receiving water, and the quality of its sludge

(4) Compliance Monitoring - The POTW must develop procedures for monitoring its industrial users to determine compliance and noncompliance

(5) Procedures - The POTW must develop administrative procedures to implement its pretreatment program

(6) Resources - The POTW must have sufficient resources (funds, equipment, and personnel) to operate an effective and ongoing program.

1.3 SUMMARY OF RECOMMENDATIONS

The recommendations summarized in this section, when implemented, should enable final approval of the M-O-T Pretreatment Program by E.P.A. Region III (The State of Delaware does not have an approved Pretreatment Program). The National Pretreatment Program is entangled in controversies and legal battles. Congress is currently debating amendments to the Clean Water Act which may enable municipalities to "Opt-out" of the federal pretreatment program. Under these circumstances it may not be prudent for New Castle County to immediately implement these recommendations.

This report documents the existence of technical basis and resources needed for implementing the program. Some legal and legislative actions are needed to comply with all requirements for final program approval. It is suggested that conditional approval of the Pretreatment Program be requested at this time, with the understanding that on receipt of the conditional approval (and any comments), New Castle County will move expeditiously to implement these recommendations. After all recommended changes are implemented, the county will apply for final program approval. The recommended changes are summarized as follows:

Non-Domestic Discharge Limitations

The methodology used to develop defensible local discharge limitations are detailed in Chapter 4. Recommended numerical limitations are summarized on Table 17, page 4-36. These limitations should be incorporated in the Town of Middletown Ordinance. New Castle County Ordinance 75-238 should be amended to include these limitations applicable to the M-O-T service area. A different set of limitations will continue to be applicable to the northern New Castle County service area.

The numerical limitations listed on Table 17 may be amended if the State of Delaware DNREC issues regulations on sludge disposal which are different from the North-Eastern States criteria used here.

Legal Authority

New Castle County Ordinance 75-238 should be amended as recommended in Section 3.3, Chapter 3. The Middletown Ordinance should be similarly amended. After implementing these changes, the draft Attorney's Statement (Appendix F) should be suitably amended and submitted for final program approval.

Administrative Procedures

All program implementation procedures are already in existence and no formal changes are required. The M-O-T Pretreatment Committee should continue to meet and help in program implementation.

Organization and Funding

Due to the small size of this Program in relation to the available resources in Public Works Department, no formal changes in organization or funding are necessary. An updated Pretreatment Program Endorsement signed by the Director of Public Works should be submitted to obtain final program approval.

2. INDUSTRIAL WASTE SURVEY

Section 403.8(f)(2) of the General Pretreatment Regulations requires a POTW to identify and locate all possible industrial users subject to the pretreatment program, and to identify the volume and character of pollutants discharged by these users. The Industrial Waste Survey (IWS) is commonly used to obtain this information. Such information is essential in developing the pretreatment program because it provides the basis for many other activities. By identifying these industries and what they discharge, we can logically identify sources of known (or suspected) treatment plant problems, develop local limits for problem dischargers, determine sampling and analysis needs (both at the industries and in the treatment plant itself), and estimate manpower and equipment needs.

2.1 SOURCES OF INFORMATION

The first step in conducting an IWS is to develop a master list of all industries in the service area that discharge to the treatment system. This was relatively easy for the M-O-T system as very few industries are located in this area. In addition, a comprehensive "Inventory of Non-Domestic Dischargers into the Wastewater Collection Systems in New Castle County, Delaware" was published by New Castle County Areawide Waste Treatment Management Program (208 Agency) in December 1975. This information was updated by consulting other sources. The sources of information used to compile the master list were:

1. 208 Inventory - 1975
2. Delaware Chamber of Commerce roster - 1981
3. Sewer Connection Permit records - Current
4. Sewer Billing Records - Current
5. Interview with Engineering Consultants to the Town of Middletown

The M-O-T Treatment Plant has no problem attributable to conventional pollutant loadings at this time. There is enough spare capacity to absorb reasonable increases in loadings for the next ten years. Accordingly non-domestic groups of users contributing only conventional pollutants were eliminated from the survey effort. These included:

Dischargers of Sanitary waste only

Hotels, motels and restaurants

Gas stations

Personal Service establishments

Offices and retail sales shops

Educational institutions

The Industrial Waste Survey results are tabulated on Table 2. Based on these results only three industries, all located in Middletown, were identified for follow-up investigation. Data on these industries was already available from an Industrial Waste Questionnaire submitted in 1981. The results of this questionnaire are summarized on Table 3. For additional comfirmation, these industries were visited and sampled in June 1981. On the basis of this data on Middletown industries (Appendix C) it was determined that only one industry, a lead-acid battery manufacturer, was contributing significant quantities of lead (Pb).

TABLE 2

INDUSTRIAL WASTE SURVEY RESULTS

MIDDLETOWN-ODESSA-TOWNSEND REGIONAL SYSTEM

Company Name	Company Address	SIC Code	No Discharge to POTW	Domestic Wastewater Only (Noncontact Cooling, Boiler/Tower Blowdown)	Pollutants In Nondomestic Wastewater: 129 Priority Pollutants	Prohibited Pollutants	Did Not Respond
Lehigh Valley Ind. Inc. T/A	500 W. Cass St. Middletown, DE	2258	Closed				
Seams, Inc.	R.D. 1 Box 205 Middletown, DE	2329 2389	XX				
Blue Ridge - Winkler Textiles	500 W. Cass St. Middletown, DE		Closed				
Fouracre, A. Claude T/A Middletown Transcript	24 W. Main St. Middletown, DE	2711		XX			
Letica of Delaware, In.. Middletown Ind. Park	P.O. Box 11 Middletown, DE	3079		XX			
Globe Union, Inc.	North Broad St. Middletown, DE	3691			Pb(2mg/1)	pH (potential)	
Ocean Pro Manufacturing Co.	U.S. Rt. 13 P.O. Box 124 Townsend, DE	3949	XX				
Hercules, Inc.	P.O. Box 257 Middletown, DE	3079		XX			
Townsend Meat Mkt.	State St. Townsend, DE	2011					
Townsend Grain Feed Co.	P.O. Box 36 Townsend, DE	4221		XX			

TABLE 3

MIDDLETOWN INDUSTRIAL WASTE QUESTIONNAIRE - 1981

S U M M A R Y

1. Letica of Delaware Inc. - Polyethylene Pails and Lids Mfg.
   Flow 6880 gpd
   No priority pollutants anticipated

2. Hercules, Inc. - Polypropylene and polyethylene container Mfg.
   Flow 6866 gpd
   No priority pollutants anticipated

3. Globe Battery Div., Johnson Controls - SIC 3691 Lead Acid Auto Batteries Mfg.
   Lead and Sulfuric acid used
   Flow 35,000 gpd
   Anticipated Priority Pollutants:
   - Antimony
   - Arsenic
   - Barium
   - Chromium
   - Copper
   - Lead
   - Nickel
   - Zinc

   Other toxicants anticipated
   - pH - H_2SO_4

The other industries were discharging only sanitary wastewater. The battery manufacturer was sampled again in September 1983 to quantify its contribution in relation to the treatment plant effluent and sludge quality. These results are discussed in Chapter 4.

2.2 SUMMARY OF RESULTS

Currently, only one industrial user, a lead-acid battery manufacturer (SIC 3691) discharges significant quantities of (Pb) in the M-O-T regional system. In addition, historical records of the phased out Middletown Sewage Treatment Plant indicate serious upset problems associated with wastewater discharges of very high as well as very low pH attributed to this same industrial user (I.U.)

The I.U. discharges about 35,000 gpd into the M-O-T system which is about 9% of the current plant influent, and contributes about 23% of lead (Pb). The concentration of Pb in the I.U. discharge is highly variable and has been measured from a low of 2 mg/l to a high of 11 mg/l. The I.U. has existing pretreatment facilities consisting of neutralization and clarification. Additional information on the I.U. is contained in Appendix C.

3. LEGAL AUTHORITY

The ability to develop and implement a successful pretreatment program depends on there being adequate legal authority at the local level, since program implementation and control rest with local government. The legal authorities that a local government must have to implement the pretreatment program are listed in Section 403.8(f)(1) of the General Pretreatment Regulations. To summarize, the POTW must be able to:

- Deny or condition new or increased contributions of pollutants, or changes in the nature of the pollutants discharged to the POTW
- Require compliance with applicable pretreatment standards and requirements by IUs
- Control, through permit, contract, or other means, the contribution to the POTW by each IU
- Require the development of a compliance schedule by each IU, and the submission of all notices and self-monitoring reports as necessary to assure compliance
- Carry out all inspection, surveillance, and monitoring procedures to determine compliance independent of information supplied by the IU
- Obtain remedies for noncompliance, including the ability to seek injunctive relief, seek civil or criminal penalties, and/or collect liquidated damages
- Obtain effective summary relief from industrial waste discharges that endanger public health, the environment, or POTW operations
- Comply with the confidentiality requirements and limitations on data restrictions specified in 40 CFR 403.14.

3.1 EXISTING ORDINANCES

Section 403.8(f)(1)(i-vii) of the General Pretreatment Regulations states the specific legal authorities required in an ordinance to implement and enforce a pretreatment program.

E.P.A. has developed a model ordinance (Appendix D) to help municipalities develop suitable ordinances. For New Castle County the legal authority for implementation of the Pretreatment Program is derived from New Castle County Code Chapter 16, Article VIII, entitled "Regulation of Non-Domestic Wastewater Discharges into the Public Sewer System", Ordinance NO. 75-238. This Sewer Use Ordinance (Appendix E) complies with the pretreatment requirements of the Water Pollution Control Act of 1972. Some minor modifications will be needed to comply with the Clean Water Act of 1977. The draft Pretreatment Statement (Appendix F) from the County Attorney notes the authorities that do not exist at this time. Necessary amendments to these regulations will be proposed as and when the U.S. Environmental Protection Agency finally decides on the national Pretreatment Strategy and requirements. The M-O-T service area includes the Town of Middletown which is an independent jurisdiction within New Castle County.

The Town of Middletown is in the process of amending the Town Code by adding a new article entitled "Regulation of Non-Domestic wastewater discharges in the Public Sewer System". These regulations of Middletown (Appendix G) have been developed on the model of the New Castle County regulations and will provide adequate authority to carry out the Pretreatment Program in conjunction with a sewer Agreement.

The Director of New Castle County Department of Public Works is responsible for supervising and funding the POTW Pretreatment Program with the approval of the County Council. The County Council has already endorsed the pretreatment program through Ordinance No. 75-238. A Statement from the Director reflecting endorsement of year-to-year funding of Pretreatment Program, if approved, is enclosed as (Appendix H).

3.2 INTERJURISDICTIONAL AGREEMENTS

The M-O-T regional system serves more than one political jurisdiction. The towns of Odessa and Townsend and adjacent areas are directly under county jurisdiction. However, the Town of Middletown, where the I.U. is located, is an incorporated municipality. The Town, while recognizing the need for an effective pretreatment program, has a good historic working relationship with its industries and is unwilling to cede program control to the county. As a result, it has been necessary for the two jurisdictions to undertake a cooperative venture in the program development. This was accomplished by creation of the Pretreatment Committee which formulated recommendations to amend an existing sewer Agreement signed on August 2, 1976. An amendment to this Agreement was duly signed on May 18, 1982. Both of these interjurisdictional agreements are attached in Appendix I. Paragraph 6 of the amended Agreement specifies that the Town will formulate and enforce Pretreatment Regulations. As the Town does not possess sampling resources, paragraph 14 grants inspection and sampling authority to the county.

3.3 RECOMMENDED CHANGES

Ordinance 75-238 entitled "Regulation of Non-Domestic Wastewater Discharges in the Public Sewer System" is the source of legal authority for implementation of the Pretreatment Program. Table 4 compares this ordinance with the E.P.A. Model ordinances. The items in the Model ordinance which are not covered in county ordinance are:

1.1 Policy and Objectives

2.2 Categorical Standards

2.3 Procedures for Modification of Standards

4.3.1 Compliance Date Report

4.7 Confidential Information

TABLE IV

COMPARING ORDINANCE 75-238 WITH THE E.P.A. MODEL ORDINANCE

40 CFR, Part 403	EPA Model Ordinance	Item	N.C.C. Ordinance 75-238
	SECTION 1	GENERAL PROVISIONS	
		Identification of:	
	1.1	Purpose	Title
	1.1	Policy	
	1.1	Objectives	
	1.2	Definitions	16-60
	1.3	Abbreviations	N/A
	SECTION 2	REGULATIONS	
403.5	2.1	General Discharge Prohibitions	
403.5(b)(1)	2.1(a)	(1) fire/explosion hazard	16-61(d)
403.5(b)(2)	2.1(c)	(2) pH/corrosion	16-61(h)
403.5(b)(3)	2.1(b)	(3) solid or viscous - obstruction/interference	16-61(e)(1)
403.5(b)(4)	2.1(j)	(4) volume or strength to cause interference	16-61(e)(3)
403.5(b)(5)	2.1(i)	(5) heat	16-61(a)
		Others include: Toxic pollutants. noxious or malodorous, objectionable color, slug flows, radioactive wastes, etc.	16-65; 16-61(c)(f)
403.6	2.2	Requirement that industries comply with Federal Categorical Pretreatment Standards	
403.7	2.3	Procedures for Modification of Standards (Removal Credits)	
	2.4	Specific Pollutant Limitations - concentration limit for arsenic, cadmium, copper, cyanide, lead, mercury, nickel, silver, total chromium zinc, total identifiable chlorinated hydrocarbons, and phenolic compounds.	16-63; 16-62(a)

TABLE IV - Contd.

COMPARING ORDINANCE 75-238 WITH THE E.P.A. MODEL ORDINANCE

40 CFR, Part 403	EPA Model Ordinance	Item	N.C.C.Ordinan 75-238
	2.5	State Requirements	N/A
	2.6	City's Right of Revision	16-62(b)(c)
	2.7	Prohibition of Excessive Discharges	16-72(c)
	2.8	Prohibition of Accidental Discharges	16-81
	SECTION 3	FEES	
	3.1	Purpose	N/A
	3.2	Charges and Fees	
	3.2(a)	(a) reimbursement for set-up and operating the Pre-treatment Program	N/A
	3.2(b)	(b) fees for monitoring, inspection and surveillance procedures	N/A
	3.2(c)	(c) review of accidental discharge procedures and construction	N/A
	3.2(d)	(d) permit applications	N/A
	3.2(e)	(e) filing appeals	N/A
	3.2(f)	(f) fees for consistent removal (by POTW)	N/A
	3.2(g)	(g) other fees deemed necessary	N/A
	SECTION 4	ADMINISTRATION	
403.8(f)(1)i	4.1	Wastewater Discharge Authorization Requirement	16-70
403.8(f)(1)iii	4.2 4.2.1	Wastewater Contribution Permits General Permits	16-70

TABLE IV - Contd.

COMPARING ORDINANCE 75-238 WITH THE E.P.A. MODEL ORDINANCE

40 CFR, Part 403	EPA Model Ordinance	Item	N.C.C.Ordinar 75-238
	4.2.2	Permit Application	16-71
403.8(f)(1)ii-vi	4.2.3	Permit Modifications (for Categorical Standards)	16-73
403.8(f)(1)i-vi	4.2.4	Permit Conditions	16-72
	4.2.5	Permit Duration	16-73
	4.2.6	Permit Transfer	16-74
403.8(f)(1)iv	4.3	Reporting Requirements for Permittee	
403.12	4.3.1	Compliance Date Report	
403.12	4.3.2	Periodic Compliance Reports	16-72(g)
403.8(f)(1)v	4.4	Monitoring Facilities	16-75(b)
403.8(f)(1)v	4.5	Inspection and Sampling Requirements	16-75
403.8(f)(1)ii	4.6	Pretreatment Requirements	16-72(e)
	4.7	Provisions for Confidential Information	
	SECTION 5	ENFORCEMENT	N/A
403.8(f)(1)vi	5.1	Harmful Contributions	16-61
403.8(f)(1)i-vi	5.2	Revocation of Permit	16-82
	5.3	Notification of Violation	16-84
	5.4	Show Cause Hearing	16-85(b)(1)
403.8(f)(1)vi	5.5	Legal Action	16-88
	SECTION 6	PENALTY: COSTS	
403.8(f)(1)vi	6.1	Civil Penalties	16-87
	6.2	Falsifying Information	16-82(a)(b)

TABLE IV - Contd.

COMPARING ORDINANCE 75-238 WITH THE E.P.A. MODEL ORDINANCE

40 CFR, Part 403	EPA Model Ordinance	Item	N.C.C.Ordina 75-238
	SECTION 7	SEVERABILITY	
	SECTION 8	CONFLICT	N/A
	SECTION 9	EFFECTIVE DATE	Section 2
	SECTION 10	INDUSTRIAL SEWER APPLICATION	Enclosed
	SECTION 11	WASTEWATER DISCHARGE PERMIT	Enclosed

In addition, authority to publish notification in local newspapers of non-compliance and enforcement actions should be provided. It is recommended that these suggested changes be debated by the M-O-T Pretreatment Committee and suitable amendments be drafted for submission to the respective councils for adoption. This should be done after receiving comments from the State of Delaware Division of Environmental Control and the E.P.A. on this submission.

3.4 ATTORNEY's STATEMENT

A draft statement is attached as Appendix F. This will be executed by the county attorney after receiving comments on this submission.

4. TECHNICAL INFORMATION

Technical information provides the basis for a pretreatment program. It enables us to quantify industrial pollutants within the treatment system, establish local effluent limits for IUs, and develop an effective compliance monitoring system. This chapter focuses on the technical information gathered to operate this program, to develop local effluent limits, and to include in the program submission. In addition, this chapter provides a detailed methodology to establish local discharge limitations as part of the pretreatment program.

In order to develop this technical information, the following information was compiled:

- Descriptive background information about the POTW and its service area
- Existing POTW performance data for convertional, nonconventional, and priority pollutants (including historic data on plant problems)
- Data on the priority pollutant sampling and analysis performed at the treatment plant
- Limitations placed on the POTW's effluent and sludge
- Methodology for determining local effluent limitations.

4.1 M-O-T REGIONAL SYSTEM

The purpose of including background information with this submission is to provide the reviewer with an understanding of the treatment plant, its service area, and the problems it has encountered with industrial pollutants.

Figure 1 shows the M-O-T service area as well as the other POTWs in New Castle County. The largest POTW serving the northern part of the county is operated by the City of Wilmington.

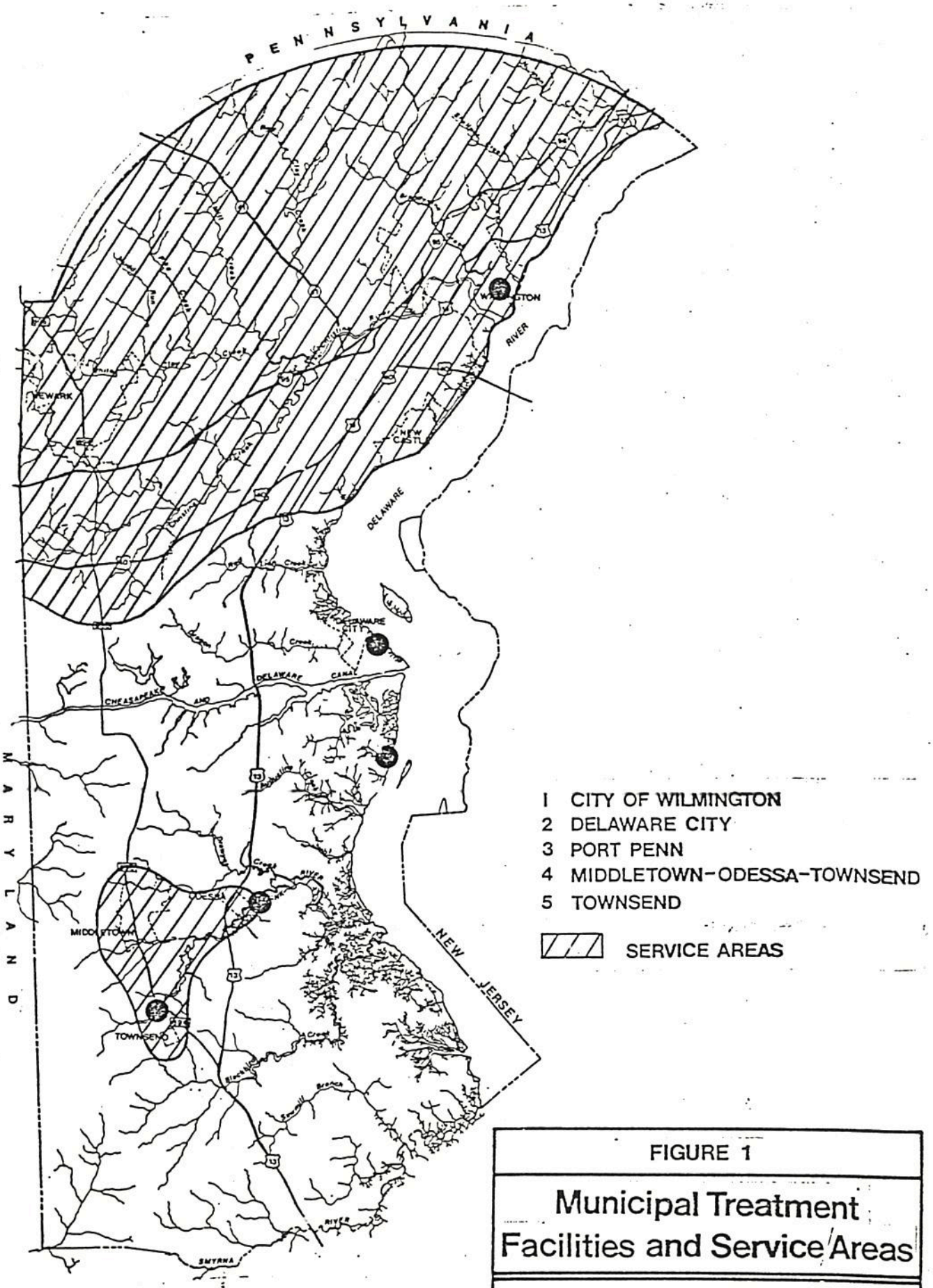

FIGURE 1

Municipal Treatment Facilities and Service Areas

WRA for NCC

The city is currently developing a Pretreatment Program for this region with the active cooperation of the county. The Delaware City POTW is a 0.5 MGD plant with no industrial contributors. The Port Penn POTW is a small 0.05 MGD plant with no industrial contributors. No pretreatment programs are required for these two POTWs.

The M-O-T Regional Sewer System (Figure 2) serves the southern portion of the county. The area served by the M-O-T system is largely agrarian in character and includes the three population centers - Middletown, Odessa, and Townsend. Of the three, only Townsend is served by its own treatment plant, and that facility is scheduled to be phased out by the end of 1984 upon construction of a transmission system to convey the Town's wastewater to the regional system.

Present contributors to the M-O-T regional system (Table 5) include a private boarding school, the Town of Odessa, and the Town of Middletown. Middletown owns and operates its own sewer system and it is into the Middletown system that all the industries discharge.

Of the three industries in Middletown which use water as part of their manufacturing, two are involved in the injection molding of plastic containers and use water only for cooling and sanitary purposes. The remaining industry, a lead-acid battery manufacturing operation, is the only discharger of industrial wastes to the sewer system. An on-site pretreatment facility at the plant controls pH and incidentally reduces the metals load to the sewer. These metal loads, however, remain the primary concern for the treatment works.

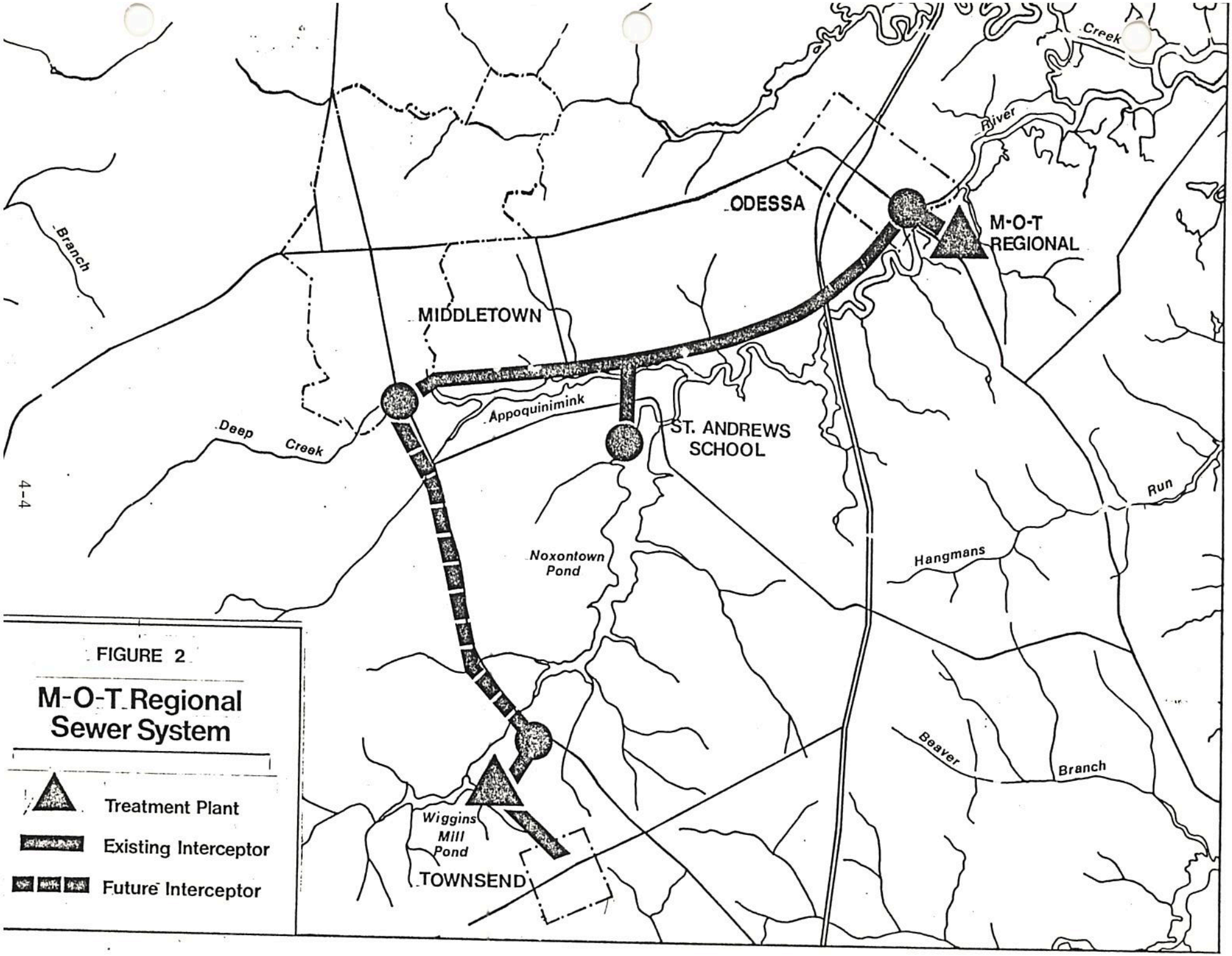
Creek
River
ODESSA
M-O-T
REGIONAL
Branch
MIDDLETOWN
Appoquinimink
Deep
Creek
ST. ANDREWS
SCHOOL
Run
Noxontown
Pond
Hangmans
Beaver
Branch
Wiggins
Mill
Pond
TOWNSEND
FIGURE 2
M-O-T Regional
Sewer System
Treatment Plant
Existing Interceptor
Future Interceptor

TABLE 5

CONTRIBUTORS TO

M-O-T REGIONAL SYSTEM

CONTRIBUTOR	POPULATION	FLOW (gpd)
Odessa	130	10,000
St. Andrews School	250	20,000
Middletown	2,900	315,000
Townsend (future)	(380)	(35,000)
Total Present	3,280	345,000
(Future)	(3,660)	(380,000)

Wastewater from St. Andrews School and the Town of Middletown are transported by means of a four-mile long interceptor to the Town of Odessa, at which point all flows are pumped to the treatment plant (Figure 2).

The M-O-T facility is a tertiary treatment plant consisting of a hydrosieve, dual primary clarifiers, a 5-stage rotating biological contactor, dual final clarifiers, a sand filter and a chlorine contact tank. The system has a design capacity of 1.0 mgd. As the current flow is less than 0.5 mgd, only one primary and one final clarifier are in use. Figure 3 shows the Site Layout and Figure 4 shows the Process Flow.

Sludge processing facilities consist of a large aerobic digester, a Dual-Cell-Gravity sludge dewatering unit followed by a Multi-Roll-Press belt filter capable of producing dewatered sludge with 12 percent solids.

4.2 PLANT PERFORMANCE

The treatment plant was started up in April 1981. Table 6 summarizes the 1982-1983 plant performance and compliance with NPDES permit limitations. During the 18-month period, the plant has met all NPDES permit requirements very consistently. Removals of BOD and TSS have averaged over 95 percent, a commendable performance even though the plant is hydraulically and biologically underloaded. Removal of Lead (Pb) has also been surprisingly high. Influent lead concentrations vary widely between 0.2 mg/1 to 2 mg/1. During 1981 concentrations as high as 50 mg/1 were recorded. Effluent Lead concentrations have averaged less than 0.03 mg/1.

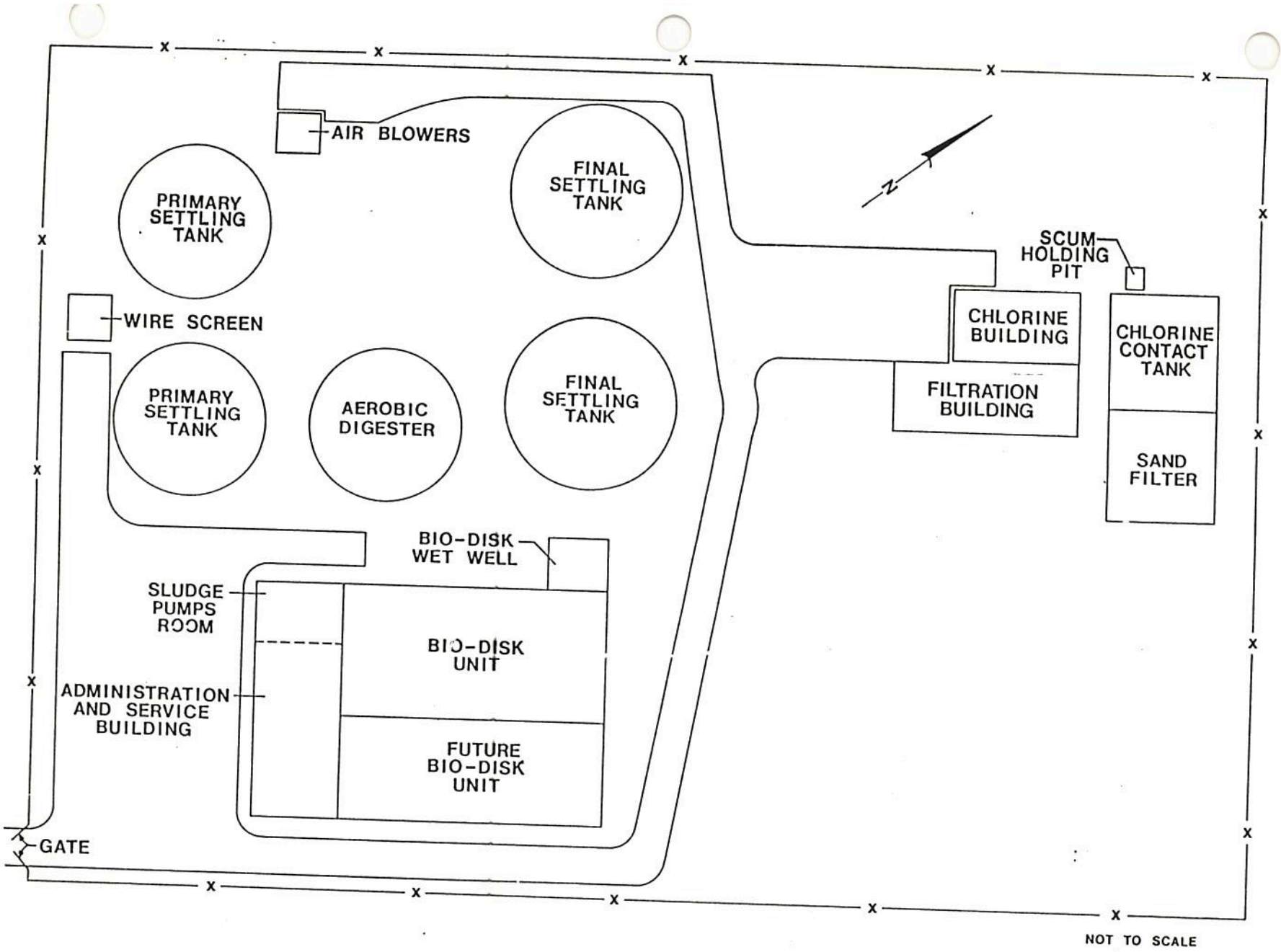

FIGURE 3

SITE LAYOUT
MIDDLETOWN-ODESSA-TOWNSEND WASTEWATER TREATMENT FACILITY

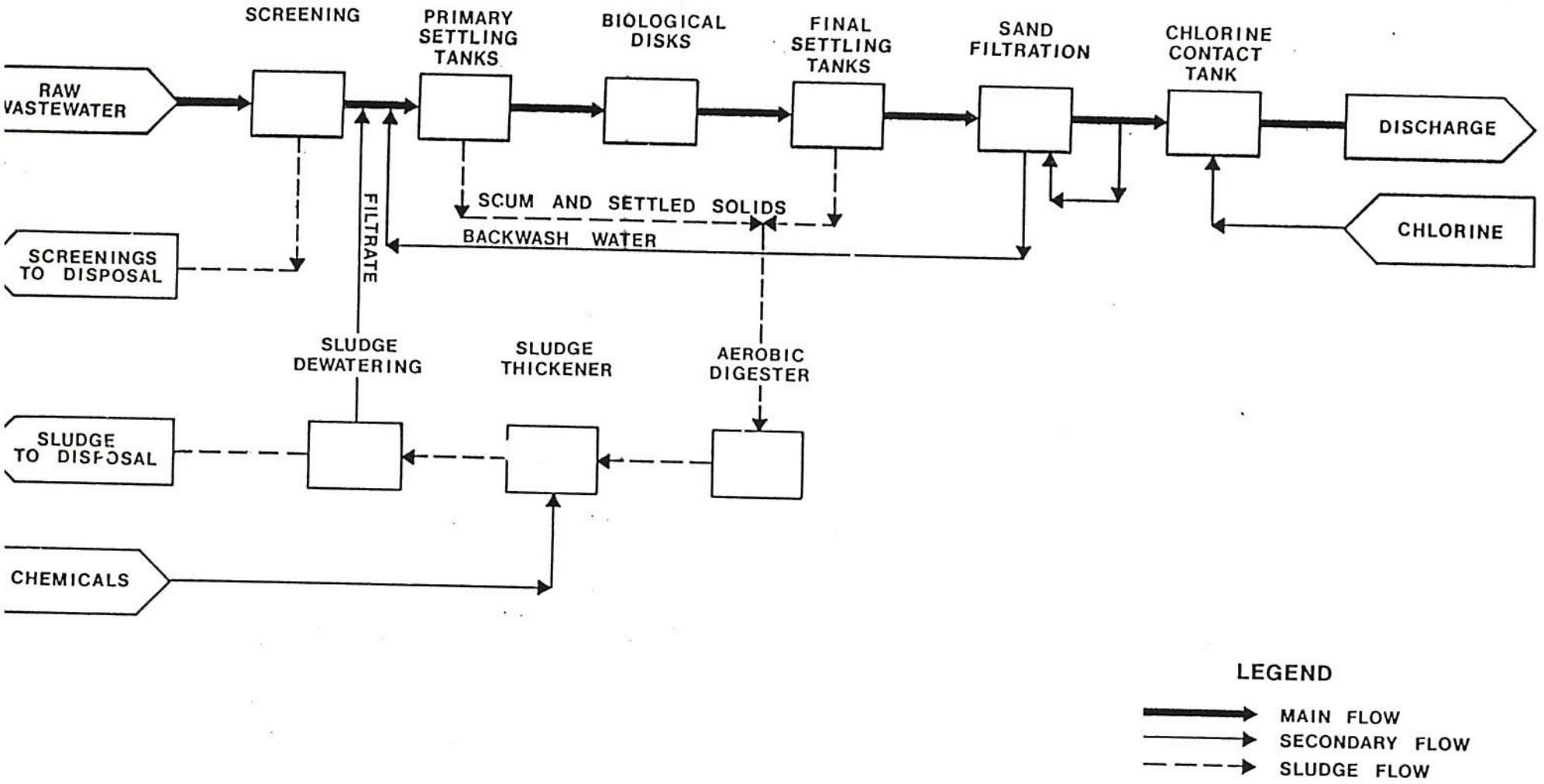

FIGURE 4

SIMPLIFIED PROCESS FLOW DIAGRAM
MIDDLETOWN-ODESSA-TOWNSEND
WASTEWATER TREATMENT FACILITY

TABLE 6

M-O-T REGIONAL WASTEWATER TREATMENT PLANT

SUMMARY OF PLANT PERFORMANCE DATA

1982-83

	TSS, mg/l			BOD, mg/l			Pb, mg/l			pH Value				Chlorine Residual mg/l		Total Coliform	Fecal Coliform	Dissolved Oxygen	Temp. °C
										Inf.		Eff.		Eff.		#/100ml	#/100ml	mg/l	
	Inf.	Eff.	Rem.	Inf.	Eff.	Rem.	Inf.	Eff.	Rem.	Min.	Max.	Min.	Max.	Min.	Max.	Eff.	Eff.	Eff	Eff.
DES nit	-	15	-	-	15	-	-	0.15	-	-	-	6.0	9.0	1.0	4.0	1000	200	-	-
1982																			
AN.	109	7	94%	97	3	97%	0.95	< 0.15	>84%	6.7	7.3	6.5	7.4	1.8	3.9	11	< 3	9.0	10
EB.	169	12	93%	143	7	95%	1.35	< 0.15	>89%	6.8	7.1	6.5	6.9	1.8	3.9	< 3	< 3	9.4	10
AR.	173	11	94%	101	6	94%	0.60	< 0.15	>90%	6.7	6.9	6.5	7.1	1.5	3.7	5	8	9.4	10
PR.	223	7	97%	143	10	93%	0.40	0.05	88%	6.7	7.2	6.4	7.2	1.3	3.8	< 3	< 3	9.0	12
AY	130	8	94%	134	10	92%	0.25	< 0.15	>40%	6.9	7.4	6.6	7.1	1.2	2.6	5	6	7.7	16
JNE	143	7	95%	157	6	96%	0.55	0.02	96%	6.8	7.1	6.4	6.8	1.2	3.5	< 3	< 3	8.0	18
ILY	147	5	97%	152	5	97%	0.50	0.02	96%	6.7	7.0	6.4	7.2	1.3	2.6	< 3	< 3	7.1	21
IG.	125	6	95%	97	6	94%	0.60	0.02	97%	6.6	6.9	6.3	7.3	1.2	2.1	< 3	29	6.2	22
PT.	248	7	97%	154	6	96%		0.05		6.5	7.0	6.4	7.2	1.6	3.6	< 3	24	6.3	20
T.	149	3	98%	163	5	97%		0.05		6.6	6.8	6.2	7.1	1.4	3.8	< 3	< 3	5.4	19
V.	114	7	94%	129	6	95%		0.05		6.4	6.7	6.2	6.7	1.3	3.4	< 3	< 3	4.2	16
C.	177	7	96%	166	6	96%		0.05		6.8	7.1	6.3	6.9						

TABLE 6 Contd.

M-O-T REGIONAL WASTEWATER TREATMENT PLANT

SUMMARY OF PLANT PERFORMANCE DATA

1982-83

	TSS, mg/l			BOD, mg/l			Pb, mg/l			pH Value				Chlorine Residual mg/l		Total Coliform	Fecal Coliform	Dissolved Oxygen	Temp. °C
										Inf.		Eff.		Eff.		#/100ml	#/100ml	mg/l	
	Inf.	Eff.	Rem.	Inf.	Eff.	Rem.	Inf.	Eff.	Rem.	Min.	Max.	Min.	Max.	Min.	Max.	Eff.	Eff.	Eff/	Eff.
NPDES Limit	-	15	-	-	15	-	-	0.15	-	-	-	6.0	9.0	1.0	4.0	1000	200	-	-
1983																			
JAN.	131	4	97%	153	7	95%		0.06		6.8	7.2	6.5	7.6	1.3	3.6	< 3	< 3	6.3	11
FEB.	213	8	96%	188	5	97%		0.09		6.5	7.3	6.7	7.1	1.3	3.4	< 3	< 3	6.9	9
MAR.	121	8	93%	142	6	96%	1.24	0.03	97%	6.8	7.1	6.4	7.2	1.4	3.8	< 3	< 3	6.5	10
APR.	267	9	97%	167	5	97%	0.39	0.02	95%	6.9	7.3	6.3	7.1	1.2	3.6	< 3	< 3	6.6	11
MAY	176	6	96%	191	4	98%		0.02		7.1	7.6	6.3	7.4	1.2	3.6	< 3	< 3	6.4	13
JUNE	204	14	93%	210	11	95%	1.7	0.02	99%	6.7	7.4	6.4	7.2	1.4	2.8	10	24	6.7	15
18-Month Average	148	7	95%	149	6	96%	0.77	0.03	97%	6.7	7.5	6.4	7.1	1.4	3.4	< 3	< 5	7.0	13

The actual plant performance exceeds the design criteria as well as NPDES requirements for all pollutants. There are no known or suspected problems regarding pass through or interference. However, two potential concerns have been identified and these are the primary focus of the M-O-T Pretreatment Program:

(i) pH: The old Middletown Treatment Plant had a history of plant upsets due to spills of acids or neutralizing alkalies at the battery plant. The same potential problem exists at the M-O-T plant.

(ii) Heavy Metals in Sludge: The treatment plant removes practically all the Lead (Pb) from the wastewater, which is concentrated in the sludge. Other heavy metals are also substantially removed.

4.3 PRIORITY POLLUTANT SAMPLING

The IWS indicated that only one manufacturing industry, a lead-acid battery manufacturer, discharges pollutants of concern into the M-O-T system. To confirm this, an initial test of the influent and the effluent for the 129 priority pollutants was done. 24-hour composite samples were taken during March 28-29, 1983. At the same time, the significant industrial user was also sampled and tests were run on heavy metals to quantify industrial contribution of heavy metals.

Appendix J contains the full results of the priority pollutant analyses conducted by New Castle County Laboratory. Some of the heavy metals are present in significant concentrations. However, only 5 organic priority pollutants were detected (Table 7) of which only 3 were above 10 ppb level. All these three pollutants are Phthalate esters which are present in domestic wastewaters at these levels.

TABLE 7

ABSTRACT OF ORGANIC PRIORITY POLLUTANTS

DETECTED IN M-O-T WASTEWATERS

March 28-29, 1983

GC/MS FRACTION	COMPOUND	M-O-T CONCENTRATION, ppb INFLUENT	EFFLUENT
1. Volatile	None	-	-
2. Acid	Pentochlorophenol	NF	3.9
3. Base/Neutral	Bis (2-Ethylhexyl)Phthalate	42.7	13.5
	Butyl Benzyl Phthalate	8.4	NF
	Diethyl Phthalate	64.6	56.4
	Di-N-Butyl Phthalate	13.7	NF
4. Pesticides	None	-	-

These results show that no additional monitoring for organic toxic pollutants is required at M-O-T. Local discharge limitations should concentrate on heavy metals and inorganics.

The priority pollutant data was compared with a "Matrix of Priority Pollutants Potentially Discharged from Industrial Categories" for the Battery Manufacturing Category (Appendix J). This information was developed from Industry Summaries prepared by E.P.A., dated March 1979, from the published development documents for effluent limitations from industrial point sources. It was found that the single organic listed on the E.P.A. matrix (3,4-benzopyrene) was not detected in the M-O-T influent. Other priority pollutants of potential significance are Cd, Pb, Hg, Ni Ag, Zn. Of these, four (Cd, Pb, Ni, Zn) were found in significant concentrations in M-O-T influent but two (Hg, Ag) were not. In addition As, Cu and Se were present in significant concentrations. This information is useful in the development and modification of local discharge limitations.

4.4 SLUDGE DISPOSAL

The lower New Castle County Sludge Management Plan, approved by the County Council as well as the Delaware Division of Environmental Control, calls for a central sludge composting facility at the M-O-T site for the final disposal of dewatered sludge from the other County facilities and the M-O-T plant. This will be an E.P.A. construction grant project and is expected to be on line by July 1984. For the interim, sludge is disposed of into the Wilmington Pollution Control facility. Preliminary data on sludge quality indicate that copper may be of more limiting concern than lead, when recommended E.P.A. loading rates are used for land application of sludge.

Further continuing monitoring of sludge quality is planned because influent lead concentrations vary so widely and, in the long term, lead may be the limiting metal.

As required by the Resources Conservation & Recovery Act (RCRA), a composite sludge sample was tested for E.P. Toxicity in 1982. Only a partial screening was completed, but the results show a concentration of lead (Pb) in the extract of 0.3 mg/l. This is uncomfortably close to the "hazardous" limit of 0.5 mg/l. If the sludge is classified as hazardous, it would have to be handled and disposed of in accordance with RCRA regulations, and the cost of sludge disposal will be prohibitive.

The sludge composting facility will be located near the M-O-T treatment plant. It will compost all the sludge from county treatment plants. Table 8 lists the treatment plants and sludge production rates. The composting project includes a two-step dewatering facility (DCG followed by a filter press), mechanized sludge/wood chips mixer, forced air composting in silo-type vessels, curing pads, screens for removal of wood chips, and a series of conveyor belts for material handling. The finished compost will be applied on New Castle County park lands as soil stabilizer. No compost will be marketed or given away to the public.

SLUDGE CRITERIA:

The State of Delaware Department of Natural Resources & Environmental Control (DNREC) do not have regulations governing the land application of finished compost. Regulations are currently being developed and may be promulgated by the end of 1984. DNREC is aware of the proposed composting facility and the following monitoring and reporting requirements have been specified per letter dated November 1, 1983 from William G. Kazor, Supervisor, DNREC:

TABLE 8

NEW CASTLE COUNTY TREATMENT PLANTS

SLUDGE PRODUCTION - 1982

	POTW LOCATION	DESIGN FLOW, MGD	SLUDGE PRODUCED DRY LBS/DAY
1.	Delaware City	0.50	350
2.	Port Penn	0.05	32
3.	Townsend	0.05	108
4.	M-O-T, Odessa	0.50	380
	TOTAL, 1982		870
	Composting Facility Design Capacity		1000

1. Semi-annually, in January and June, analyze a six-month composite sample of the finished compost for the following parameters; Ammonia-Nitrogen, Nitrate-Nitrogen, Total Kjeldahl Nitrogen, Lead, Zinc, Copper, Nickel, and Cadmium. The composite must be preserved by means of refrigeration, freezing, or other form of treatment to ensure that the constituents of the compost undergo minimum change.

2. Annually, in June, we request that a record of the distribution of the finished compost be submitted to the Department. Also, if the treatment or processing of the compost changes in any way, you shall include that information in the report.

3. If your plans of distribution change from those indicated in your August 29, 1983, letter to me, you will advise this office immediately.

These requirements do not address the acceptable pollutant levels in the compost, or the permissible rate of application. E.P.A. has issued various guidelines on land application of sludges which can be used for land application of compost. Some useful references which can be used for management of the composting project are:

1. Process Design Manual for Sludge Treatment and Disposal, October 1974, E.P.A. 625/1-74-006
2. Municipal Sludge Management: Environmental Factors, October 1977, E.P.A. 430/9-77-004
3. Sludge Handling and Conditioning, February 1978, E.P.A. 430/9-78-002

"Considerations for Applying Sewage Sludge on Agricultural Land", taken from reference (2) are attached as Appendix K. These guidelines give procedures for calculating sludge application rates on the basis of sludge composition, soil characteristics, and crops to be grown. Numerical limitations on Nitrogen and heavy metals (Pb, Zn, Cu, Ni, Cd) application rates are also specified.

Besides the E.P.A. guidelines, some other published guidelines are Those of North Eastern States Sludge Management Committee, California Health Department and New York Conservation Commission. These guidelines are summerized on Table 9. As the table demonstrates, these criteria vary widely. The heavy metals of concern for M-O-T have been determined to be copper (Cu) and lead (Pb). When E.P.A. criteria is applied, Cu is the limiting pollutant as the maximum allowable loading for Cu is one-fourth that for Pb. When the N.E. States criteria is applied, Pb is the limiting pollutant as the allowable concentrations for both these metals are the same.

In the absence of State regulations governing compost applications, it will be premature to develop local limitations based on E.P.A. or N.E. States guidelines. The State regulations are expected to be issued within a year and it is recommended that local discharge limitations for pollutants listed on Table 9 be finalized after these regulations are promulgated.

4.5 CURRENT LOCAL DISCHARGE LIMITATIONS

The current local discharge limitations given on page 9 of Ordinance 75-238 (Appendix E) were developed on the basis of water quality limitations applicable to the Wilmington Pollution Control Facility which services northern New Castle County.

TABLE 9

SLUDGE CRITERIA

COMPARISON OF SOME GUIDELINES

Pollutants	Maximum Application, lbs/acre				Maximum Concentration, mg/Kg, dry	
	E.P.A.			New York	California	N.E. States
	(1)	(2)	(3)	(4)	(5)	(6)
Cd	5	10	20	10	50	25
Cu	125	250	500	250	-	1000
Cr	-	-	-	-	-	1000
Hg	-	-	-	-	-	10
Ni	50	100	200	150	-	200
Pb	500	1000	2000	1000	500	1000
Zn	250	500	1000	500	-	2500
PCB	-	-		-	2	10

(1) Soil C.E.C. 0-5 meq/100 g

(2) Soil C.E.C. 5-15 meq/100 g

(3) Soil C.E.C. >15 meq/100 g

(4) Non-farmlands

(5) Public recreational areas

(6) Maximum concentrations in sludge used for composting

These limitations are not applicable to the M-O-T system and a new set of limitations need to be developed. The M-O-T local limitations should be developed on the basis of water quality or effluent limitations, sludge limitations for composting, interference in treatment processes and potential hazards for POTW workers.

WATER QUALITY LIMITATIONS:

The NPDES permit issued to the M-O-T plant (Appendix A) specifies limits on conventional pollutants and on one heavy metal, lead (Pb). However, State of Delaware Regulations Governing the Control of Water Pollution (Appendix L) places limits on sixteen (16) conventional, non-conventional and toxic pollutants. These limits are enforceable on all dischargers in Delaware and should form the basis for local limitations. In addition, the Delaware River Basin Commission (DRBC) have developed Effluent Quality Requirements which are published in the following document:

Administrative Manual - Part III
BASIN REGULATIONS - WATER QUALITY
Delaware River Basin Commission
Trenton, New Jersey

The M-O-T plant discharges into Appoquinimink River a tributary of Delaware River and so the DRBC limitations are also applicable to M-O-T. In some cases DRBC limitations are more stringent than DNREC limitations and in such cases the more stringent value should be used.

Where no DRBC or State water quality standards or criteria exist, the Federal water quality criteria should be used. These water quality criteria are published in the following documents:

- Federal Register: EPA Water Quality Criteria Documents November 28, 1980, Part V, Availability.

- Quality Criteria for Water, an EPA publication known as the "Redbook" and available from: National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (703-487-4650). The publication is also available from Regional EPA Offices or local libraries.

4.6 RECOMMENDED CHANGES

It is recommended that Ordinance 75-238 be modified to include separate local discharge limitations for contributors to the M-O-T system. These need to be defensible numerical limitations developed to implement the objectives of the National Pretreatment Program:

- To prevent the introduction of pollutants into the POTW which could interfere with its operation

- To prevent the pass-through of untreated pollutants which could violate applicable water quality standards.

- To prevent the contamination of POTW sludge which would interfere with selected sludge uses or disposal practices.

As mentioned earlier it will be premature to develop limitations based on sludge criteria before the State develops regulations in this field. However, a methodology can be developed for implementation at that time.

METHODOLOGY:

The impact of an incompatible pollutant on a POTW must be evaluated simultaneously from the three fundamental program objectives described above. The limit for the pollutant must then be set to ensure that all three objectives are met. It should be pointed out that the limiting factor that meets the most restrictive of the three objectives may vary from pollutant to pollutant. For example constraints on the land application of sludge may limit the allowable influent concentration of cadmium, while effects on water quality may limit the influent concentration of copper.

As a general procedure, influent concentration limits should be calculated for a particular pollutant based on each of the three factors (i.e., treatment processes, water quality, and sludge). The most stringent of the three will determine the influent limit to be used for that pollutant. The next step is to translate that influent limit into discharge limits for industrial users that discharge the pollutant into the sewerage system.

Figure 5 shows the basic steps needed to develop discharge limitations.

Interference/Inhibition:

The biological processes used at this plant are rotating biological contactors for secondary treatment and aerobic sludge digestion. There is little reliable information on the threshold concentrations of toxic pollutants that inhibit these processes. Some data are available on Activated Sludge, Nitrification and Anaerobic Sludge Digestion and these are summerized on Table 10. These numerical values cannot be directly applied for the M-O-T plant but do serve the purpose of giving an idea of the order of magnitude of the threshold concentrations for these toxic pollutants.

In view of the fine performance of the M-O-T plant with removal rate for conventional pollutants exceeding 95% there is no reason to believe there are any inhibitory pollutants at this time. Removal rates for heavy metals are also much higher than the national averages published by E.P.A. Therefore, at this time at least, inhibitory criteria can be ignored in developing local limitations. If at any time in the future, biological inhibition is detected or suspected, then further studies will be required.

FIGURE 5

STEPS TO DEVELOP

LOCAL DISCHARGE LIMITATIONS

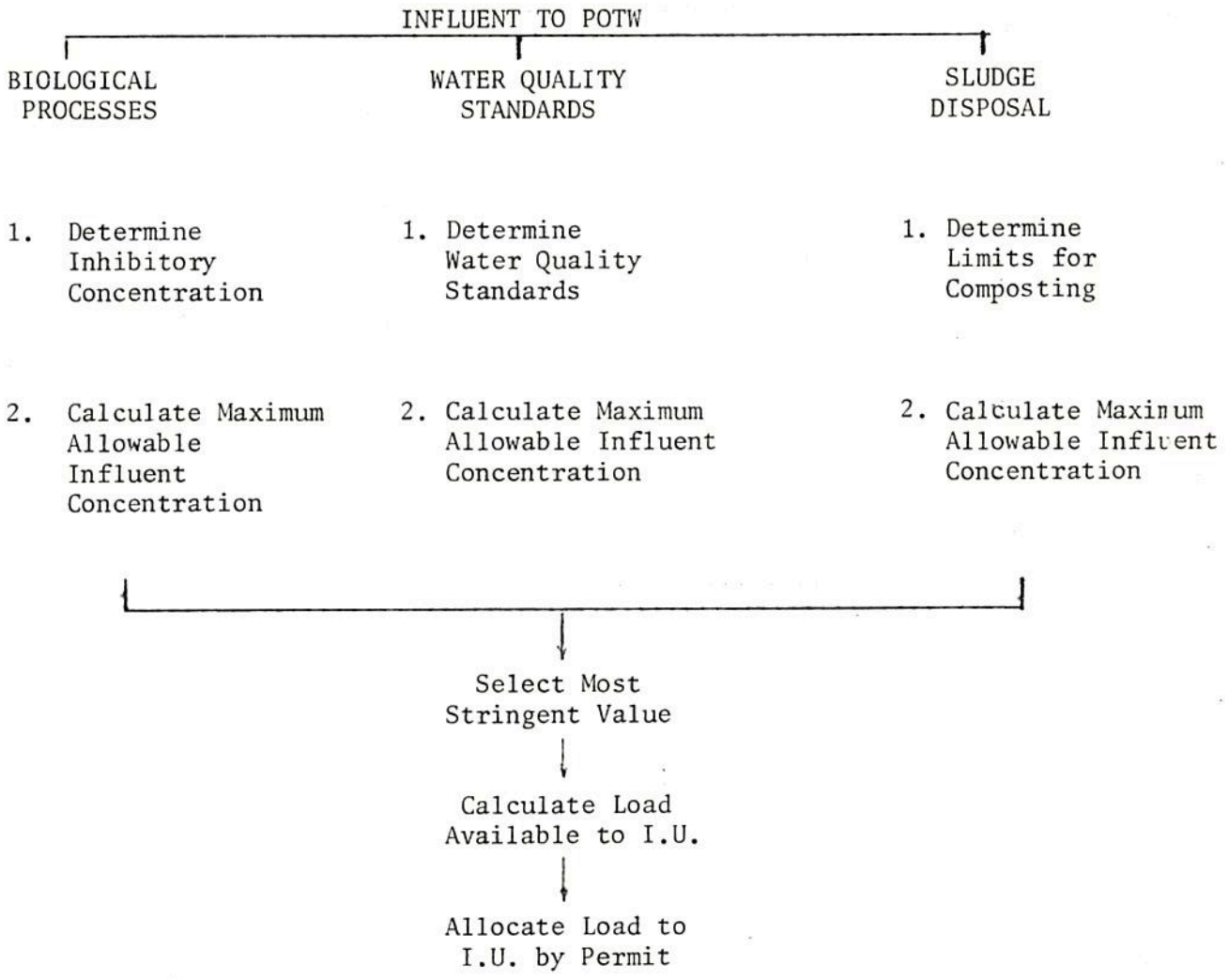

TABLE 10

THRESHOLD CONCENTRATIONS* OF TOXIC POLLUTANTS
THAT INHIBIT BIOLOGICAL TREATMENT PROCESSES

Toxic Pollutant	Threshold of Inhibitory Effect on Activated Sludge	Threshold of Inhibitory Effect on Nitrification	Threshold of Inhibitory Effect on Anaerobic Sludge Digestion
Arsenic	0.05 mg/l		1.5 mg/l
Cadmium	1.0 mg/l		0.02 mg/l
Chromium (total)	10 mg/l		100 mg/l
Chromium (hex)	1.0 mg/l		50 mg/l
Copper	1.0 mg/l	0.1 mg/l	10 mg/l
Cyanide	0.1 mg/l	0.5 mg/l	4 mg/l
Lead	0.1 mg/l	0.5 mg/l	
Mercury	0.1 mg/l		
Nickel	1.0 mg/l	0.5 mg/l	10 mg/l
Zinc	1.0 mg/l	0.1 mg/l	20 mg/l

*Concentrations are specified at influent of the unit process in dissolved form.

Reference:

Draft Procedures Manual
for Preparing a POTW
Pretreatment Program
Submission, April 29, 1983
JRB Associates

Water Quality Standards:

The Delaware Water Quality Inventory prepared by DNREC classifies the Blackbird-Appoquinimink segment as Effluent Limited. This means that the water quality goals for the M-O-T receiving waters (Appoquinimink) will be achieved by imposing effluent limitations on dischargers. The applicable effluent limitations are those set by DNREC and DRBC (Section 4.5) and the more stringent of the two should be used for developing local limitations.

The maximum allowable pollutant loading at the POTW effluent should be calculated by converting the concentration to mass, using the design flow. This will ensure that local limitations are not required to be revised every time there is a change in the domestic: industrial contribution ratio. To use the design flow, a reasonable projection must be made based on past trends and planned development in the service area. Table 11 shows the current and projected industrial contributions.

TABLE 11

CURRENT AND PROJECTED INDUSTRIAL CONTRIBUTION

M-O-T SERVICE AREA

	Sanitary	Industrial	Total
Current (1983) Flow, MGD	0.35	0.03	0.38
Projected Design Flow, MGD	0.44	0.06	0.50
Projected Increase	26%	100%	31%

An increase of 31% in the total flow is needed to reach the design capacity of 0.50 MGD. It is conservatively projected that this may be achieved by an increase of 26% in sanitary waste and a doubling of the small industrial contribution.

At the M-O-T plant, sludge will be dewatered at site, and the filtrate will be recycled. Therefore no allowance for sludge wasting need to be made in the mass balance calculations.

Given the maximum allowable pollutant concentration in the effluent (Ce) and the average removal efficiency (R, expressed as a decimal) the maximum allowable influent concentration

$$Ci = Ce/(1-R)$$

The removal efficiencies for most pollutants of concern have been determined for the M-O-T plant. Influent and effluent concentrations were measured for seven (7) heavy metals for three consecutive days during September 28-30, 1983 using 24-hour composite samples. These are the metals of concern in sludge disposal and include lead (Pb) which is the only metal on the NPDES permit. Other priority pollutants were sampled during March 29-30, 1983 (Appendix J) and removal rates obtained from the influent and effluent data. The removal rates at M-O-T are much higher than the average national removal rates given in EPA publications. However when specific M-O-T removal efficiencies are not available, literature values and average national removal rates given in EPA publications have to be used.

Table 12 summarizes the maximum allowable influent concentrations calculated for pollutants limited by State regulations or appear on the inorganic priority pollutant list.

TABLE 12

MAXIMUM ALLOWABLE INFLUENT CONCENTRATIONS

WATER QUALITY BASIS

(M-O-T Regional Wastewater Treatment Plant)

Pollutant	Effluent Criteria, mg/l		Removal Efficiency, %		Maximum Allowable
	DNREC	DRBC	M-O-T	Literature	Influent Conc. mg/l
Antimony	-	-	48	-	-
Arsenic	-	0.10	24	-	0.13
Barium	-	2.00	-	25	2.66
Beryllium	-	-	-	-	-
Cadmium	0.10	0.02	42	38	0.034
Chromium (hex)	-	0.10	-	-	-
Chromium (T)	0.15	-	55	65	0.33
Copper	0.50	0.20	76	58	0.83
Cyanide	0.05	-	-	52	0.10
Fluoride	3.00	-	-	-	-
Iron	2.00	-	84	-	12.50
Lead	0.15	0.10	96	48	2.50
Mercury	0.005	0.01	28	-	0.007
Nickel	1.00	-	75	19	4.00
O&G	10	10	-	90	100
Phenol	1.00	-	-	50	2.00
Selenium	0.02	0.02	37	-	0.03
Silver	0.10		88	66	0.83
Thallium	-	-	44	-	-
Zinc	1.00	0.60	85	65	4.00

Underscored values used in calculations

As mentioned in Section 4.3 organic priority pollutants are of insignificant concern at M-O-T. It is seen that there is no available criteria or apparent need to specify limitations on Antimony, Beryllium and Thallium. Limitations on total chromium are deemed better than on hexavalent chromium as total chromium is of concern in sludge disposal also. Fluoride appears on the DNREC limitations list but is of no concern at M-O-T as the receiving waters are tidal and not used for drinking water supply.

Sludge Disposal Criteria:

The next step is to calculate a set of maximum allowable influent concentrations on the basis of sludge disposal. As discussed in Section 4.4, there is no specific criteria available at this time for land application of compost - the approved disposal option at M-O-T. The EPA guidelines do not limit the concentrations of pollutants but just the rates of application. The N.E. States Sludge Management guidelines are definitely more stringent as they specify limits on pollutant concentrations and limit more pollutants than EPA. In addition these limits are more easily enforceable by States as enforcing application rates is more difficult. For these reasons N.E. States criteria is being tentatively used to determine local limitations. It is recommended that these values be modified finally on issuance of State regulations.

Comparison of M-O-T sludge analytical data with the data on composite sludge from all county plants showed that M-O-T sludge has higher concentrations of all heavy metals. The other plants have cleaner sludge.

It is recommended that M-O-T sludge be required to comply with N.E. States criteria thereby giving a factor of safety when the composite sludge is used for composting.

Sludge production rate at the current flow of 0.38 mgd averages 380 lbs/day dry solids. At the design flow of 0.50 mgd, the projected sludge production rate will be 500 lbs/day and this value should be used in computing limitations:

N.E. States Sludge Management guidelines specify maximum allowable pollutant concentrations in mg/Kg, dry weight, which equals parts per million, for seven (7) heavy metals. This maximum concentration (S_m) can be converted to maximum allowable influent loading (L_i in lbs/day) given the removal rate (R, expressed as a decimal) and sludge production rate of 500 lbs/day by using the equation:

$$L_i = 500 \times (S_m/1,000,000) \times 1/R = 0.0005 \ (S_m/R)$$

This loading rate can be converted into maximum allowable influent (0.50 mgd) concentration (C_i) in mg/l by using the equation:

$$C_i = L_i/(0.50 \times 8.34) - 0.24 \ L_i$$

For ease of calculation, the above two equations can be combined to give the simple equation:

$$C_i = 0.00012 \ (S_m/R)$$

Using the above equation with removal rates as shown on Table 12, the maximum allowable influent concentrations can be calculated. Table 13 lists these concentrations and compares these to the maximum values derived earlier on water quality basis. It is seen that the sludge criteria requires more stringent limitations on all seven heavy metals.

TABLE 13

MAXIMUM ALLOWABLE INFLUENT CONCENTRATIONS

SLUDGE QUALITY BASIS

(M-O-T Regional Wastewater Treatment Plant)

	N.E. States Criteria, (S_m, mg/kg)	Removal Rate, R**	Maximum Allowable Inf. Conc. (C_i, mg/l	
			Sludge Basis*	W.Q. Basis**
Cadmium	25	0.42	0.007	0.034
Chromium	1000	0.55	0.22	0.33
Copper	1000	0.76	0.16	0.83
Lead	1000	0.96	0.13	2.50
Mercury	10	0.28	0.004	0.007
Nickel	200	0.75	0.032	4.00
Zinc	2500	0.85	0.35	4.00

* $C_i = 0.00012\ (S_m/R)$

** Values from Table 12

PCB has not been included as a pollutant to be limited as it was not detected in the influent or the effluent during priority pollutant sampling. In addition Betz, Converse & Murdock, Consultants on the composting project, ran priority pollutant analyses on a composite sludge sample from all county plants and PCB was not detected.

Sludge Quality:

The M-O-T sludge was analyzed for five heavy metals during 1982. Table 14 compares these values with the N.E. States criteria. In addition the table lists metal concentrations calculated on the basis of influent and effluent data for three days during September 28-30, 1983. It is seen that the theoretically derived concentrations compare quite well with the measured concentrations. This demonstrates that the removal efficiencies derived from the September 1983 data and used in local discharge limitation determination are reliable.

Table 14 shows that in order to meet the N.E. States criteria, Lead concentrations must be reduced drastically and copper concentrations are on the border line. All other pollutants are currently well within desired limits.

DISCHARGE LIMITS:

The most stringent of the maximum allowable influent concentrations listed on Tables 12 and 13 should be used for developing limitations on industrial discharge. The maximum pollutant loading that can be discharged by industrial users is determined by subtracting the background pollutant loading from nonindustrial sources in the system from the maximum allowable pollutant loading at the POTW's influent.

TABLE 14

M-O-T SLUDGE QUALITY

	Pollutant Concentration in mg/kg, dry weight			
	Digester February 1982	Digester July 1982	Theoretical* September 1983	Maximum Allowed N.E. States Criteria
Cadmium	13	11	25	25
Chromium	-	-	101	1000
Copper	1056	818	526	1000
Lead	6256	7714	7255	1000
Mercury	-	-	5	10
Nickel	45	35	25	200
Zinc	1689	2281	1283	2500

* Derived from influent and effluent data September 28-30, 1983.

Table 15 gives data on background concentrations from three sources of various pollutants in raw sewage coming from domestic and other non-industrial sources. The background concentrations for these pollutants are characteristic of nonindustrial sewage. Limited sampling and analysis of nonindustrial interceptors in New Castle County was conducted in April 1983 to provide more specific data on background concentrations.

Table 15 shows that AMSA values are nearer to the local values. JRB values appear to be too high, and in fact exceed desired influent values for most metals. Therefore it is recommended to use the limited New Castle County concentrations where available and to use AMSA values for all other pollutants. These values are underscored on Table 15. The pollutant loading from nonindustrial sources (L_n) is calculated by multiplying the background pollutant concentration (C_n) (found in Table 15) times the nonindustrial flow (Q_n) times 8.34.

$$L_n = (C_n)\ (Q_n)\ (8.34)$$

As mentioned earlier, the design non-industrial flow to be used in the above equation is 0.44 mgd. This non-industrial load should be subtracted from the total maximum allowable influent load for 0.5 mgd, to obtain the allowable industrial load (L) in lbs/day. As the design industrial flow is 0.06 mgd, the maximum allowable industrial concentration (C) in mg/l can be computed easily:

$$C = L/(0.06)(8.34) = 2.0L$$

Table 16 summarizes the computed allowable industrial discharge limitations for heavy metals selected for limitation, cyanide and phenolics. In addition to these pollutants, limits should be specified on common toxic pollutants which are potentially hazardous to sewer workers.

TABLE 15

TYPICAL RESIDENTIAL/COMMERCIAL SEWAGE CHARACTERISTICS

Pollutant	Concentration in mg/l		
	AMSA[1]	JRB[2]	NCC[3]
Ammonia	23.000	-	
Arsenic	0.001	0.014	
Barium	0.046	-	
Cadmium	0.002	0.010	
Chromium	0.024	0.200	0.005
Copper	0.100	0.100	0.066
Cyanide	0.010	0.025	
Iron	1.700	-	0.424
Lead	0.028	0.100	0.009
Mercury	0.001	-	
Nickel	0.015	0.050	
Phenols	0.040	-	
Selenium	0.001	-	
Silver	0.016	-	
Zinc	0.330	0.500	0.076

1. "Pretreatment Resource Reader" by Association of Metropolitan Sewerage Agencies. Washington, D.C. NTIS (Table 8-7)

2. "Draft Procedures Manual for Preparing a POTW Pretreatment Program Submission, April 29, 1983", by JRB Associates (Table 5)

3. New Castle County Laboratory data: Average of five 24-hour composite samples, April 12-15, 1983.

TABLE 16

COMPUTED INDUSTRIAL POINT SOURCE LIMITATIONS

	Max. Allowable Inf.0.50 mgd		Non-Industrial 0.44mgd		Industrial 0.06mgd	
Pollutant	Conc. mg/l	load lbs/day	Conc. mg/l	load lbs/day	lbs/day	mg/l
Arsenic	0.13	0.54	0.001	0.004	0.536	1.07
Barium	2.66	11.12	0.046	0.17	10.95	21.90
Cadmium	0.007	0.03	0.002	0.007	0.023	0.046
Chromium	0.22	0.92	0.005	0.02	0.90	1.80
Copper	0.16	0.67	0.066	0.24	0.43	0.86
Cyanide	0.10	0.43	0.010	0.04	0.39	0.78
Iron	12.50	52.13	0.424	1.56	50.57	101.14
Lead	0.13	0.54	0.009	0.03	0.51	1.02
Mercury	0.004	0.017	0.001	0.004	0.013	0.026
Nickel	0.032	0.13	0.015	0.055	0.075	0.15
Phenolics	2.00	8.34	0.040	0.15	8.19	16.38
Selenium	0.03	0.13	0.001	0.004	0.126	0.252
Silver	0.83	3.46	0.016	0.06	3.40	6.80
Zinc	0.35	1.46	0.076	0.28	1.18	2.36

These include hydrogen sulfide (H_2S) and ammonia (NH_3-N). Oils and greases create sewer blockages and create maintenance problems and should also be controlled. For these pollutants limitations have to be specified on the basis of best engineering judgement in the absence of a fixed criteria.

Table 17 lists all pollutants currently on ordinance 75-238 and the limitations as computed on Table 16. These values are rounded off to obtain the recommended local limitations for the M-O-T system. It should be noted that no limits are recommended for Barium and Iron as derived values are too high. In addition, no limits are recommended for B.O.D, T.S.S., color, and inorganic dissolved solids (I.D.S.) The projected industrial contribution is only 12 percent of the flow and the plant is currently underloaded for both B.O.D. and T.S.S. and there is no need for limiting these. Similarly there is no apparent need or rational basis for limitations on color and I.D.S. at this POTW.

TABLE 17

RECOMMENDED INDUSTRIAL POINT SOURCE LIMITATIONS

Pollutant	Current Limits Ord. 75-238	Computed (Table 16)	Recommended Limit, mg/l	Remarks
Arsenic	0.50	1.07	1.00	
Barium	4.00	21.90	-	NR
Cadmium	0.20	0.046	0.05	
Chromium	0.75	1.80	1.50	
Copper	2.00	0.86	0.75	
Iron	4.00	101.14	-	NR
Lead	0.50	1.02	1.00	
Mercury	0.015	0.026	0.02	
Nickel	2.00	0.15	0.15	
Selenium	0.05	0.252	0.25	
Silver	0.50	6.80	5.00	
Zinc	2.00	2.36	2.00	
H_2S	10	-	10	Sewer Safety
NH_3-N	35	-	35	Sewer Safety
Cyanide	0.25	0.78	0.75	
O&G (Min.)	100	-	100	Sewer Maintenance
O&G (Veg)	300	-	100	Sewer Maintenance
PO_4-P	10	-	-	NR
Phenolics	2.00	16.38	10	Sewer Safety
I.D.S.	1500	-	-	NR
B.O.D.	350	-	-	NR
T.S.S.	350	-	-	NR
Color	200 Pt.-Co.	-	-	NR
Temp	150° F	-	150° F	
pH	6.0-9.0	-	6.0-9.0	

All limitations are in milligram per liter on total pollutant except as noted for color, temperature and pH value.

5. MONITORING PROGRAM

The overall success of a pretreatment program depends on a comprehensive and properly designed local monitoring program. It is through monitoring activities that compliance with ordinance requirements is determined, user charges confirmed, and data generated for Discharge Monitoring Reports and other State or EPA required reports. A monitoring program also helps to identify the IUs responsible for discharging pollutants which are potentially harmful to the treatment plant and/or collection system.

5.1 TYPES OF MONITORING

Four types of monitoring can be used in a pretreatment program: scheduled, unscheduled, demand, and self-monitoring. An effective POTW monitoring program incorporates all four types of monitoring. A discussion of each type of monitoring follows.

Scheduled Monitoring

Scheduled monitoring involves the systematic sampling and comprehensive inspection of significant industrial contributors to the POTW system in accordance with a predetermined schedule. In determining a monitoring schedule, the following considerations should be included:

- A monitoring visit should be scheduled at least once per year for each significant IU, more often if available resources allow
- Provisions should be made with the IU for onsite inspection of pretreatment facilities and plant operations to ensure that pretreatment facilities are being operated properly and no intentional dilution of wastewater is occurring
- Composite samples should be collected and flow rate measurements performed during the sampling period.

Unscheduled Monitoring

In addition to scheduled monitoring, this is a less formal type of compliance monitoring designed to provide an unannounced inspection of industrial contributors. Unscheduled monitoring is used to randomly spot-check all sources within the collection system and is a requirement of the Federal pretreatment regulations. It is useful to ensure that collected samples are representative of actual industrial operations, particularly for industries that can easily and quickly alter their processes or operations to obtain more favorable results. Essential elements of unscheduled monitoring include:

- Monitoring performed on a random basis, with the industry at normal operation
- One unscheduled monitoring event per year, at a minimum, for each significant IU
- A confidential schedule so that industry is not aware of when the monitoring will occur; an IU should be notified immediately before a monitoring event to ensure access only when the sampling point is within the industry's property
- Inspection of plant operations and pretreatment activities
- Grab samples and flow measurements, when possible.

Demand Monitoring or Investigative Monitoring

Demand monitoring is conducted in response to a known or suspended violation discovered in a self-monitoring report, routine sampling trip, or by public complaint. Additionally, any discharge of prohibited materials can prompt demand monitoring. Demand monitoring means that when a violation is found, sampling is initiated or the frequency of sampling is increased.

Specific occurrences that may initiate the need for demand monitoring at an industry are:

- Contributions of explosive or corrosive materials or other prohibited discharges to the sewer
- Operating difficulties in the wastewater treatment system
- Violation of the POTW's permit requirements
- Violation of pretreatment regulations by an IU indicated by self-monitoring or scheduled monitoring.

Self-Monitoring

It may not be possible to perform all of the monitoring desired to ensure that the IU is complying with pretreatment requirements. POTWs have the option of requiring significant IU to do its own sampling and analysis, usually termed self-monitoring, and to have the results of this self-monitoring sent to the POTW. However, all categorical industries must self-monitor, according to the Federal pretreatment regulation. Industrial self-monitoring alone cannot be considered adequate in terms of pretreatment program requirements . Scheduled and unscheduled monitoring must be performed to verify the monitoring data reported by IUs.

5.2 MONITORING FREQUENCY

Only one significant IU is currently known to be effected by categorical standards and the M-O-T Pretreatment Program. New Castle County has an on-going monitoring program covering about 40 industrial users in the northern portion of the county who discharge into the POTW operated by the City of Wilmington. It will be a simple matter to add this one IU in Middletown and sample it every quarter. Permission from the Town of Middletown has already been obtained and forms a part of the revised interjurisdictional agreement (Appendix I). It is proposed that the monitoring frequencies will be as follows:

Scheduled	-	Two grab samples each year
Demand	-	As needed
Self Monitoring	-	Continuous pH record with alarm system, and as required by Categorical Pretreatment Regulations for Battery Manufacturing.

The Categorical Pretreatment Standards for Battery Manufacturing, the only significant IU discharging into M-O-T, were proposed on November 10, 1982 but have not yet been finalized. As proposed, the limitations are on copper and lead and these pollutants will be monitored during the sampling as well as pH. At least one composite sample will be analyzed for all heavy metals of concern in sludge management every year.

5.3 LABORATORY FACILITIES

New Castle County Department of Public Works operates two analytical laboratories. The Central Airbase Laboratory is located at N. Hollow Road, Wilmington; and the M-O-T Laboratory is located at Odessa.

Analytical work by New Castle County started in January of 1971. This work was done at the facilities of the City of Wilmington. Analyses such as pH, solids, BOD alkalinity, and COD were done. In 1974 the construction of a laboratory in a trailer to be located at the Airbase Temporary Sewage Treatment Plant was started. This laboratory was occupied in January of 1975. This facility was equipped to analyze for BOD, COD, alkalinity, solids and pH as were done before. In addition an atomic absorption spectrophotometer for the determination of metals, a visable light spectrophotometer, and equipment were provided.

In mid 1975 equipment was added to allow the quantitative determination of various gases on-site. The Hach kit for on-site determination of various contaminants of water was also provided. Laboratory equipment has been improved and expanded since that time.

Several specific ion probes are available. These are for ammonia, fluoride and nitrate. A specific ion meter has been obtained so that the response to these probes can be read directly in concentration. A vial COD apparatus has been added. This allows COD determinations to be made more rapidly and at less cost than the old reflux method.

In 1979 a TOD-TOC analyzer was obtained. This allows analyses to be made on samples which are stable to BOD and COD. It also allows unfamiliar samples to be determined so that appropriate concentrations can be made for BOD and COD determinations.

A GC/MS instrument was obtained in 1981. This is the Finnigan OWA-1020. This enables the determination of organic priority pollutants for the Pretreatment Program.

In 1981 there were over 1000 samples run at the main laboratory and 1500 samples at the laboratory at M-O-T. The laboratory at M-O-T is set up to do the analyses needed for the county treatment plant operation and for NPDES permits. This facility was opened in 1981. The personnel for the laboratory section consists of one Sanitary Chemist and three Water Quality Analysts. All these employees are well experienced in sampling and analytical work.

Once the samples are collected, they need to be analyzed accurately. Analytical results must be accurate and reproducible to assure that monitoring activities will provide the quality of information necessary for a successful industrial pollutant control program. Precise and well-recognized techniques have been established for the analysis of conventional and heavy metal parameters in wastewaters.